

DoD Installation Energy Security

Dr. Jeffrey Marqusee
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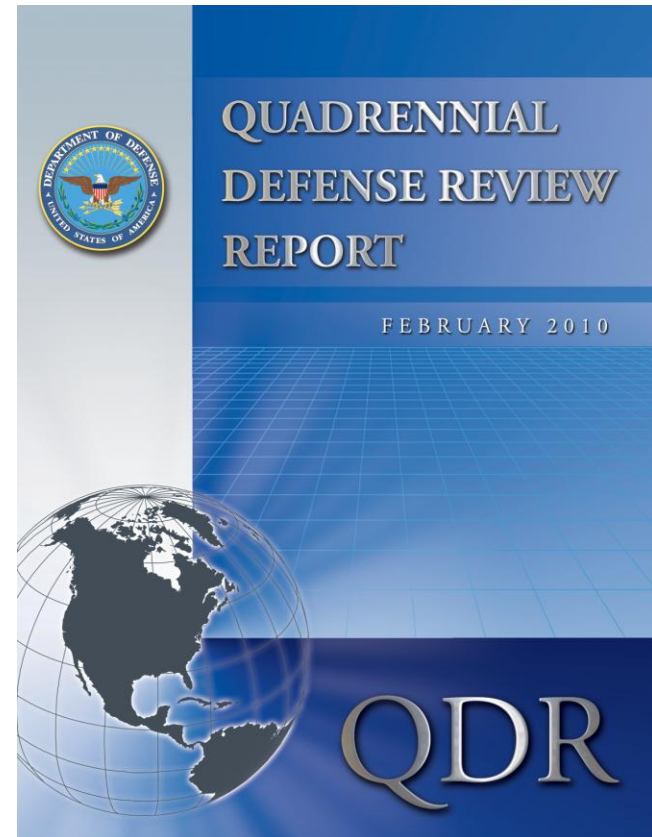


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Energy Security

- “Energy security for the Department means having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs.”



Installation Energy Security

- DoD Facilities Are a Large Consumer of Electricity
 - ◆ ~ 30B KWhr electricity in 2010 worldwide
 - ◆ US installations peak power range from ~10MW to over 100MW
 - ◆ DoD installations are in most electricity markets
 - ◆ DoD Installations often do not look like commercial facilities
 - Power profiles and security concerns

- Changing Market Offer DoD Installations Opportunities
 - ◆ New revenue streams

- DoD Drivers
 - ◆ Economics
 - ◆ Energy security



Smart MicroGrids

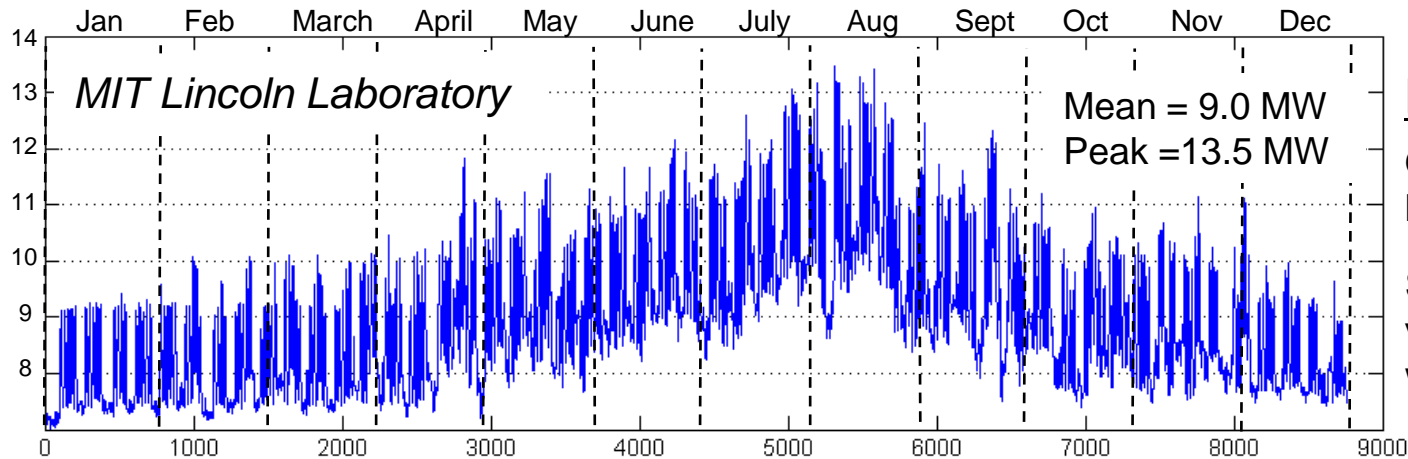
Energy Markets

Energy Markets

- Regulated Market
- Deregulated
- Deregulation on hold
- Military installation

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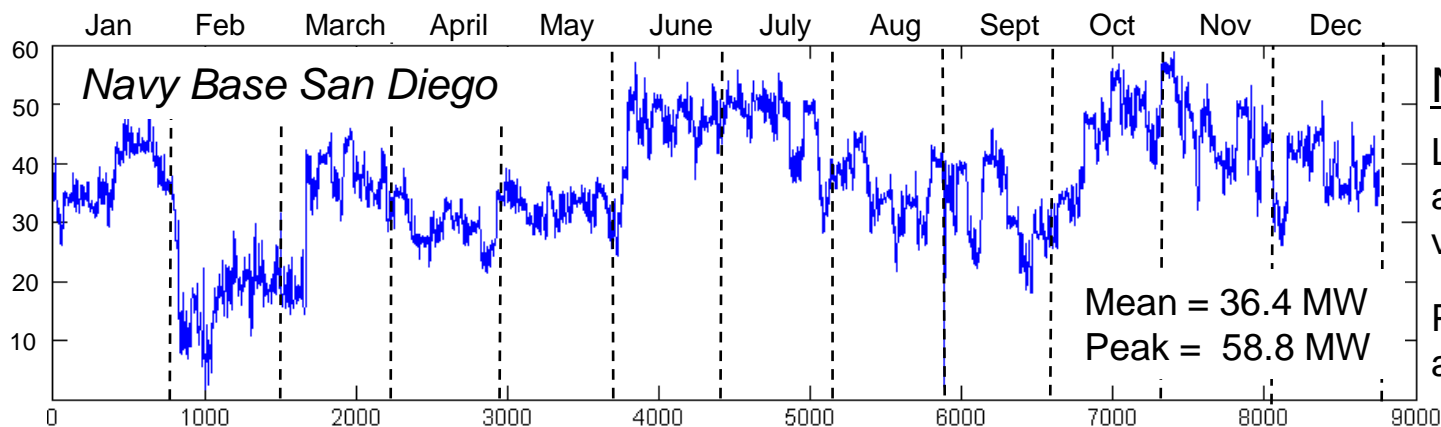
Demand Data - Examples



MIT LL

Offices and laboratories, low weekend usage.

Significant monthly variations due to weather



NBSD

Living quarters as well as working, less daily variation

Presence of ships affects energy demand

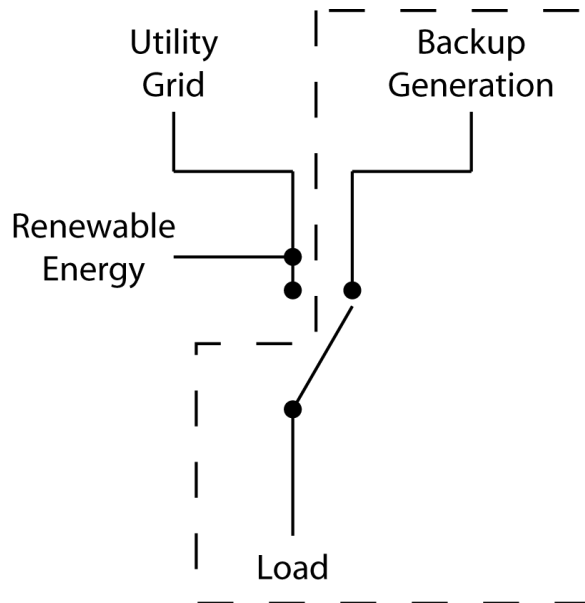
Military Installations Often Do Not Look Like Commercial Facilities

DoD and Microgrids

Primary goal of DoD installation microgrids is to provide energy security in a cost effective manner.

- Must include an interconnected set of loads and generation resources
- Implies the ability to disconnect from the main grid and operate in an islanded mode
- Choice of generation resources depends on the individual base
 - ◆ Centralized power generation in conjunction with the local utility
 - ◆ Distributed generation (DG) using existing assets on base
 - ◆ Renewable generation
- Economics depends strongly on the micro-grid's ability to operate in parallel with the larger electric grid and the local utility market

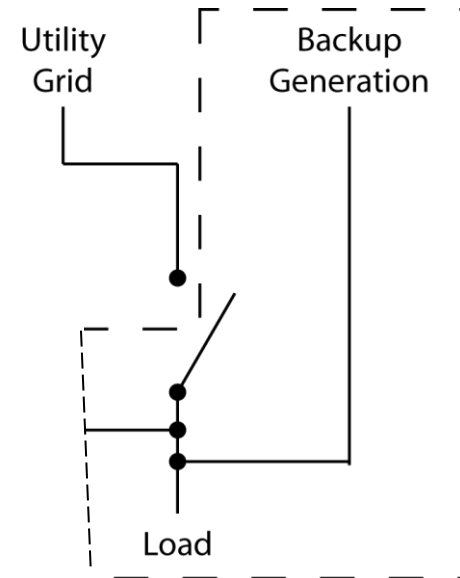
Traditional Microgrids



Cannot operate in parallel with larger grid

Traditional energy security. Only “revenue” is avoided costs from grid outages

Ex. Offut, McConnell, Kunsan

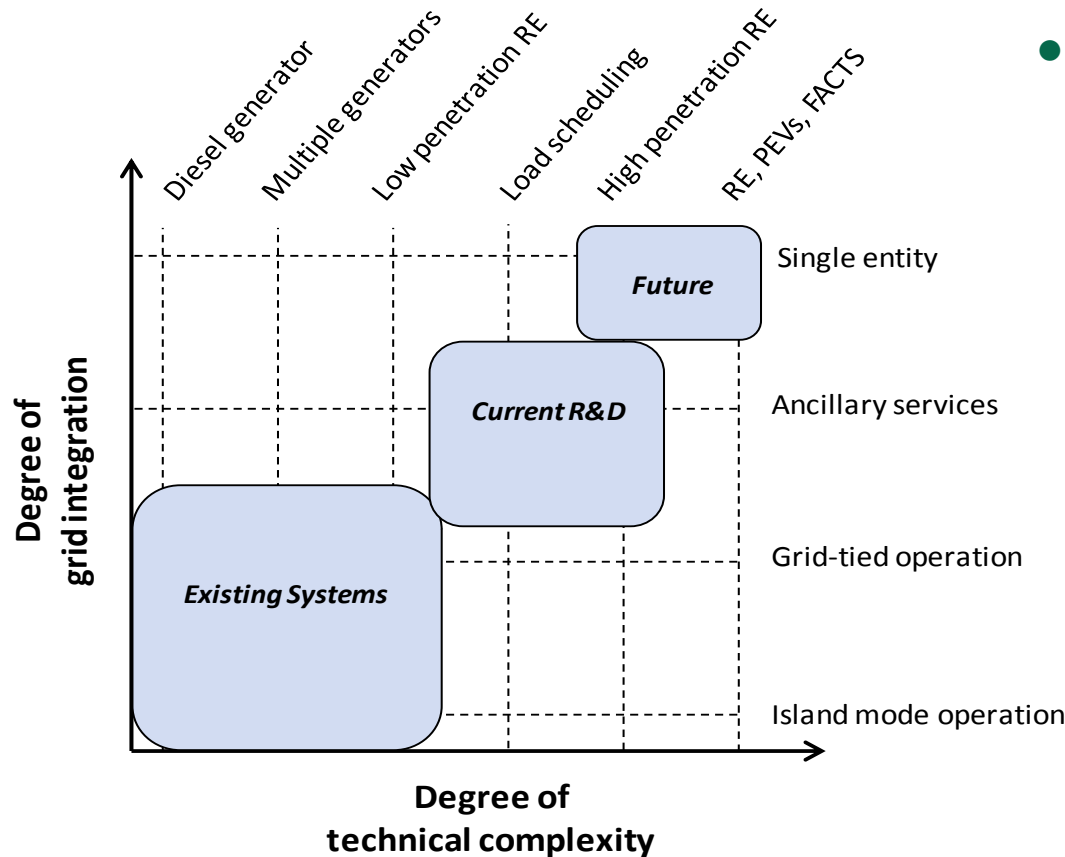


Generation resources can synchronize and operate in a parallel fashion with the utility grid or in an islanded mode – limited automation

Energy security and simple DR

Ex. Dahlgren, Ft. Detrick, Tinker

Microgrid Path



- Key challenges
 - ◆ Networking multiple generators
 - ◆ Introduction of renewable generation
 - higher penetrations potentially provides the greatest benefit
 - ◆ Faster system response
 - ◆ Seamless integration
 - ◆ Cybersecurity

ESTCP Installation Energy Test Bed

- Use DoD Facilities As Test Bed For Innovative Energy Technologies
 - ◆ Validate performance, cost, and environmental impacts
 - ◆ Transfer lessons learned, design and procurement information across all Services and installations
 - ◆ Directly reach out to private sector for innovations
 - ◆ Directly leverage DOE investments
- Develop, Test & Evaluate For All DoD Facilities
 - ◆ Energy Conservation & Efficiency
 - ◆ Renewable and Distributed Energy Generation
 - ◆ Control & Management of Energy Resources & Loads

Reduce Energy Costs - Improve Energy Security

Installation Energy Test Bed



Smart Secure Installation Energy Management

- Microgrids
- Energy Storage
- Ancillary Service Markets



Efficient Integrated Buildings

- Design, Retrofit, Operate
- Enterprise Optimized Investment
- Advanced Components
- Intelligent Building Management



On-Site Energy Generation

- Cost Effective Renewables
- Waste to Energy
- Geothermal
- Building Integrated Opportunities

Smart Secure Installation Energy Management

- Micro-grids, Energy Storage & Ancillary Service Markets
 - ◆ Four active demonstration projects
 - Lead Organizations: GE (2), UTRC and Lockheed Martin
 - 29 Palms, Ft. Bliss, McGuire AFB
 - ◆ FY 2012 : 6 new demonstration projects
 - Lead Organizations: Eaton, GE, Satcon, Raytheon, LBNL, Honeywell
 - 29 palms, Ft. Bliss, Ft. Detrick, Ft. Irwin, MCAS Miramar, LA AFB, Ft. Sill
 - Four different energy storage approaches
 - Two ancillary services demonstrations
 - ◆ Additional demonstrations in FY 2013

Microgrid Benefits

- Increased reliability at a lower overall cost
 - ◆ Networking of sources allows fewer generators
- Greater efficiency, which can lead to lower costs
 - ◆ Networking generation assets allows for load sharing
- Enabler for the integration of renewable generation
 - ◆ Provides increased energy security
- Ability to generate cost savings by using backup generation assets during normal operation
 - ◆ demand-response program and peak-shaving,
- Ability to generate financial gain by exploiting advanced ancillary services
 - ◆ Opportunity for energy storage devices or aggregated loads



Web site

www.serdp-estcp.org